

# Identification of Factors for Selecting a Hazardous Mode of Transport: A Case Study of Using Boats instead of the Bridge over Buriganga River

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**Abstract**—This observational study and survey was conducted along the bank of the Buriganga River to identify the factors that influence a large number of people to use small boats as their travel mode instead of using the bridge given the risk and dangers of crossing a big river like Buriganga by a small country boat overloaded by passengers. This study quests for the psychological as well as reasonable grounds for selecting this hazardous travel mode. Surprisingly, the research finds that most of the passengers use these boats to travel even at extreme weather condition. Most of the passengers choose this travel mode to save time. The research finds a need for improved infrastructure for the bridge and the ghats, proper traffic management, social and educational campaigns.

**Keywords**— Boat, Buriganga, Babubazar bridge, river crossing, travel mode.

## I. INTRODUCTION

Buriganga River is a tide-influenced river passing through the west and south of Dhaka City. It always has been playing a very important role in connecting the city with the whole country. In 1989, a bridge (the Bangladesh-China Friendship Bridge) was built over the river for vehicles and pedestrians connecting Dhaka with Keraniganj, but It was not sufficient to reduce commuting time and meet the demand of faster accessibility with Keraniganj. In 2001, a second bridge over the river was also built at Babubazar and created a quick link between Dhaka city and the Keraniganj [1]. The Buriganga 2nd Bridge, also known as Babubazar Bridge, has a length of 0.26 kilometres and is located about 3 km away from the city centre in the south over the river Buriganga which connects Babubazar and Jinjira. The bridge carries a 4-lane roadway and two 1.5m wide sidewalks on its 14.6m wide deck [2]. Northern end of the bridge is located adjacent to Badamtoli Ghat, Babubazar, of Old Dhaka and the southern end is at Aganagar union of Keraniganj Upazila [1]. Prior to the opening of this bridge, the bank-

to-bank traffic was compelled to travel by small country boats. After the opening of this bridge, most of the traffic diverted from the country boats to the Bridge. But, a large number of people still use the country boats (on average 10,000 passengers daily). 80% of the passengers do not know how to swim and have high-risk of accidents if the vessel sink under the water causing even death by drowning. The point of interest of this research is to identify the factors that influence the choice of using small boats as their travel mode instead of the bridge despite being aware of the possible life hazard.

## II. METHODOLOGY

A questionnaire survey was carried out on 14th August, 2016 during the morning peak hour 6:30am to 9:30am along the bank of the Buriganga River to identify the reasons for using boats instead of bridge. With the help of the study, other important information (general information of the respondents, O-D data etc.) were also collected and analyzed. Survey was done at both side of the 2<sup>nd</sup> Buriganga Bridge. Three survey points were at the Sadarghat (near Mitford, Babu-Bazar) region and three survey points were at Zinzira (near Staff quarter). Other necessary data were collected from World Wide Web.

## III. DATA COLLECTION

Total 127 nos. questionnaire surveys were collected from different Ghats at both side of the 2nd Buriganga Bridge. The weather was cloudy. It was raining during the data collection procedure. Respondents were asked questions and had to answer from the options written in the survey form.

## IV. DATA ANALYSIS

Analyses are done based on the collected data. The following sections contain the full analyses part under different sub-headings.

### 4.1 Characteristics of the Trip Maker

#### 4.1.1 Age and Sex of the Respondents

Ages of the respondents were divided into seven different age groups. The number of respondents under different age groups encountered during the survey is given in the Table. 1:

Table.1: Number of Respondents under Different Age Group

Age Group	Mitford Side	Staff Quarter Side	Total	Percentage of Total (%)
0-14	3	7	10	7.87
15-24	15	19	34	26.77
25-34	24	18	42	33.07
35-44	13	12	25	19.69
45-54	6	6	12	9.45
55-64	0	4	4	3.15
Total	61	66	127	100

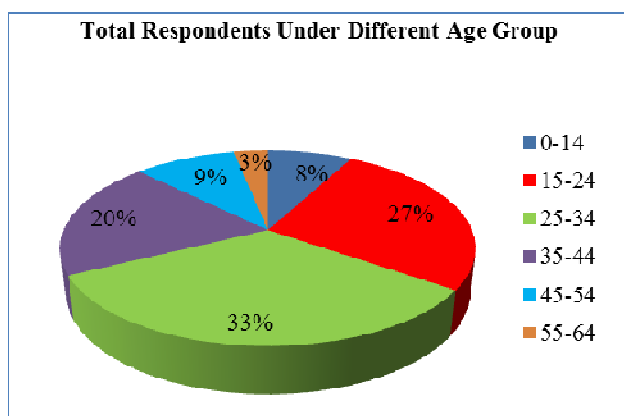


Fig.1: Total respondents under different age group

The sex of the respondents is given in the Table. 2:

Table.2: Sex of Respondents

Sex	Mitford Side	Staff Quarter Side	Total	Percentage of Total (%)
Male	46	51	97	76.38
Female	15	15	30	23.62
Total	61	66	127	100

The distribution of people under different sex is illustrated in the following pie chart.

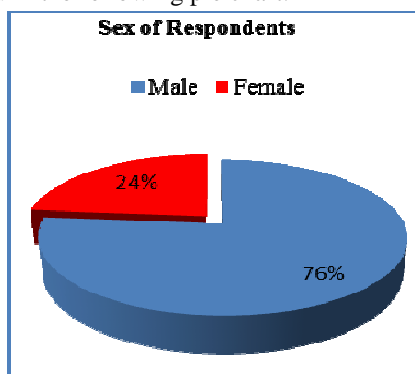


Fig.2: Total respondents under different sex group

As it is evident from the Fig.1 that major portion of the respondents (33%) are between 25 to 34 years of age. And 80% of the people crossing the river are aged between 15 to 44 years of age. That is because major portion of the people are wage earners who cross the river on daily basis for their livelihood and are more concerned of time than safety. Also it is seen from the Fig.2 that major portion of the respondents (76%) were male.

#### 4.1.2 Income Range of the Respondents

The respondents were asked about their monthly income and their responses are represented as a Pie Chart below. BDT is taken as the monetary unit.

Table.3: Monthly Income ranges

Monthly income in BDT.	Staff Quarter Side	Midfort Hospital Side	Total	%
0-4999	22	15	37	29.1
5000-9999	16	24	40	31.5
10000-14999	20	11	31	24.4
15000 or more	8	11	19	15.0
Total	66	61	127	100

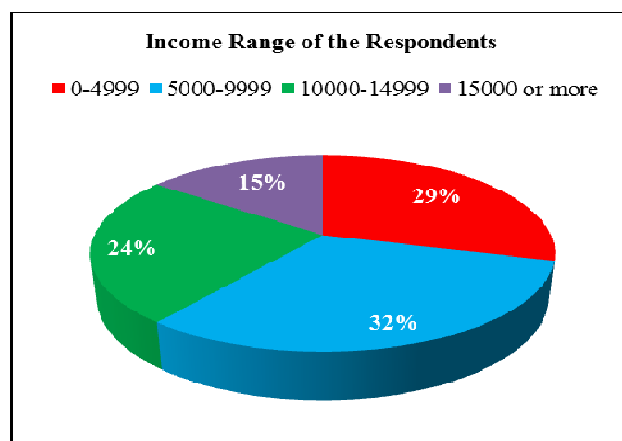


Fig.3: Pie chart for income ranges of the respondents

Major portion of the people are those who live below a monthly income of 10,000 BDT. This indicates that most of the passengers are from lower-middle class.

#### 4.1.3 Ability to Swim

The respondents were asked if they know how to swim. The answers were simply "Yes" or "No".

Table.4: Respondent's Ability to Swim

Do you know how to swim?	Staff Quarter Side	Mitford Hospital Side	Total	%
Yes	8	21	29	22.83
No	58	40	98	77.17
Total	66	61	127	100.00

% of the Respondents by Ability to Swim

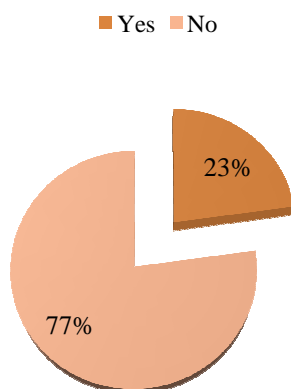


Fig. 4: Pie chart for Respondent's Ability to Swim

The relative percentage of passengers who know swimming is surprisingly low (only 23%). This result indicates that the choice of boat as travel mode is independent of swimming.

## 4.2 Characteristics of the Trip

### 4.2.1 Trip Purpose

From the survey, major purposes for trip were identified as working purpose, educational purpose (to school), marketing purpose, health purpose (to hospital) and other purposes. The Table.5 is presented as follows.

Table.5: Purpose of Trips

Purpose of trip	Staff Quarter Side	Mitford Hospital Side	Total Respondents	%
Working	30	38	68	53.54
Home	20	1	21	16.53
School	11	1	12	9.45
Market	3	7	10	7.87
Hospital	0	8	8	6.3
Others	2	6	8	6.3
Total	66	61	127	100

The relative percentage of total respondents at both sides of the river travelling for different purposes is also shown in a Pie Chart in the Fig. 5. Majority of the trips were made for work purpose.

Trip Purpose of the Respondents

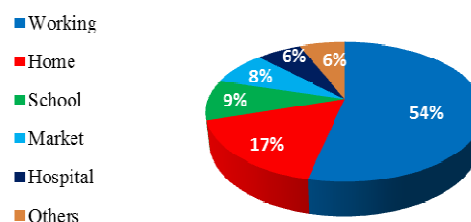


Fig. 5: Pie chart for trip purpose

### 4.2.2 Trip Frequency

It was also necessary to determine the frequency of trip people made by boat. So they were asked how many times a day and also how many times a week did they cross the river. The results are shown in the following Tables:

Table.6: Frequency of Trips in a Day

How many times in a day do you cross the river?	Staff Quarter Side	Mitford Hospital Side	Total	%
1	0	6	6	4.72
2	47	40	87	68.50
3	2	3	5	3.94
4	6	1	7	5.51
Irregular	11	11	22	17.32
Total	66	61	127	100.00

Trip frequency in a Day

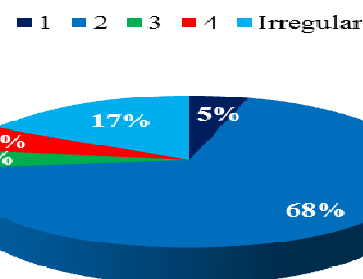


Fig. 6: Pie chart for trip frequency in a day

Table.7: Frequency of Trips in a Week

How many days a week do you cross the river?	Staff Quarter Side	Mitford Hospital Side	Total	%
1	1	4	5	3.94
2	2	5	7	5.51

3	2	1	3	2.36
4	1	2	3	2.36
5	5	9	14	11.02
6	33	19	52	40.94
7	13	14	27	21.26
<b>Irregular</b>	9	7	16	12.60
<b>Total</b>	66	61	127	100

The relative percentage of trip frequency in a day made by the respondents at both sides of the river travelling for different purposes shows that most of the passengers cross the river two times a day (69% of the total respondents) and 6 days a week. These users are daily users and make these trips for work purpose.

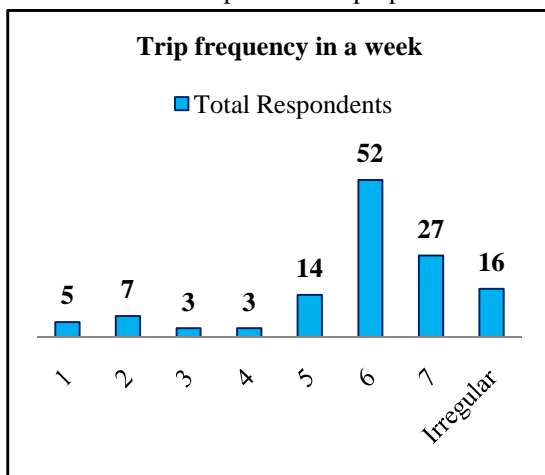


Fig. 7: Bar chart for trip frequency in a week

#### 4.2.3 Trip Distribution (O-D Survey)

An O-D survey was also performed to identify respondents' trip patterns. The O-D matrix is not shown in this paper due to space constraints. Various trip origin-destinations were identified such as: Aga Nagar, Armanitola, Babubazar, Bagna, Basundhara city, Bus stop under bridge, Cambrian College, Chawkbazar, Chorail, Companyghat, Dhakanogor, Gendaria, Gulistan, GulzerBazar, Hazaribagh, Ispahani, Kaliganj, Kalundi, Kataban, Kathuria, Keraniganj, Khejurbagan, Kodomtoli, Mitford Hospital, Mitford Staff quarter, Mirpur, Mohammadpur, Moshjid-Market, Muslim Nagar, Nader hossain road, Nagarmahol, Namapara, Nazirabad, Noya bazar, Outside Dhaka, Rajbari, Rayerbazar, Sadarghat, Shatraoza, Shoarighat, Telghat under Bridge, Wari & Zinzira.

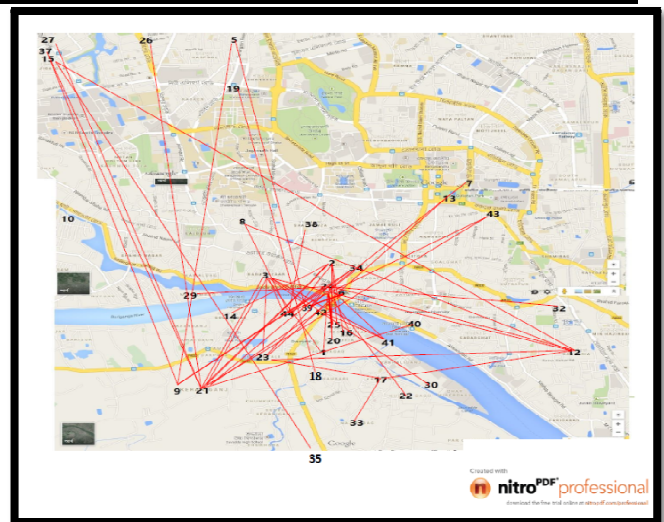


Fig. 8: O-D diagram

Highest trips were made to Mitford Hospital (25 No's). This point of attraction is a major reason to cross the river by boat because the hospital is very close to the ghat and quite far from the bridge approach. People even travel by the boat with patients.

#### 4.3 Characteristics of the Travel Mode

##### 4.3.1 Reasons for Choosing Boat Over Bridge

As the main objective of this questionnaire survey was to find out why people are using small boats to cross the river instead of using the Buriganga Bridge No. 2; hence this questions were prioritized during the survey. The results are given in the following Table.

Table.8: Causes for using Boat instead of the Bridge

Reasons to Use Boat	Mitford Side	Staff Quarter Side	Total	%
Bridge condition is not good	0	0	0	0.00
Time Consuming	27	41	68	53.54
Difficulties in Load Carrying	2	4	6	4.72
Difficult and time consuming to get on the bridge	19	20	39	30.71
Have to travel long distance to access bridge	8	0	8	6.3
Others	5	1	6	4.72
<b>Total</b>	<b>61</b>	<b>66</b>	<b>127</b>	<b>100</b>

The combined results of both side of the river are illustrated in the following pie chart.

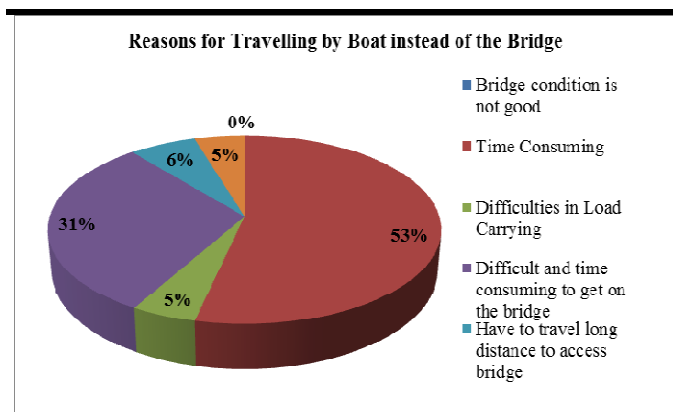


Fig. 9: Major causes of using boats instead of the bridge

More than half (53%) of the respondents finds it time consuming to use the bridge instead of boat to cross the river. This means time for accessing bridge along with time for crossing bridge is higher than the time for crossing by boat. Here time is the deciding factor. Nearly one-third (31%) of them finds it both difficult and time consuming to get on the bridge rather than using the boats. The ramp is far away. Walking to the ramp is tiresome. It is easier to cross by boat. Here unwillingness to travel long distance is the deciding factor. Both of these two reasons were collected from people with physical problems and people physically fit. As found from the survey the origin and destination of their trip were located adjacent to the river bank. The on and off ramp of the Buriganga Bridge No. 2 are located some distance away from the adjacent bank sides. There is however some stair-cases for the people to reach the bridge level near the bank sides, but the bridge level is 30 to 40 feet higher than the existing roadways. Hence people are unwilling to take the difficulties to use the bridge. Again there are always small boats waiting for passengers and the fare was very low (14 taka per boat per trip and a boat can carry 1 to 6 person at a time with or without luggage). So people can instantly get on to the boats to cross the bridge. So 6% of the respondents who are physically fit prefer using boats. Here unwillingness to climb stairs is the deciding factor. Small portion (5%) of the respondents mentioned load carrying problems in the bridge. That is a small percentage as major portion of the people cross the bridge on daily basis for their livelihood and they are mostly wage earners, so they usually don't have much to carry. Some small businessmen were found to cross the bridge to buy small machineries which can be carried easily on the boats. No one complained about the bridge condition.

People were also asked about their travel mode during extreme weather condition. Surprisingly they were found to stick with their favorite travel mode; the small boats. The following pie chart shows the travel mode of 127 respondents as percentage during extreme weather.

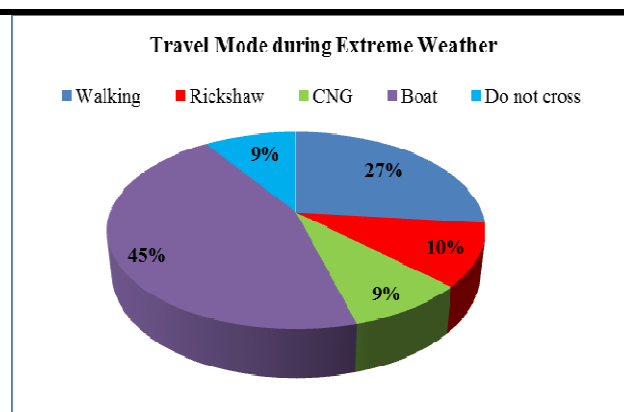


Fig. 10: Travel Behavior during Extreme Weather

As seen from the Fig. 10, nearly half (45%) of the respondents prefers boats even during the extreme weather. Most of them prefer to wait till the weather calms down and use the boats to cross the river. This is an evidence of their age old travel behavior. 46% prefer using the bridge (walking 27%, Rickshaw 10%, CNG 9%) during extreme weather condition. 9% prefer not to cross the river during bad weather.

## V. RECOMMENDATIONS

A common reason to cross the river by boat was difficulties in accessing the bridge. The ramp of the bridge is quite far from the river bank on both sides. So it is easier to use boats instead of the bridge. However it is impractical to provide ramps at every point of the river bank. Another reason to avoid the bridge is to avoid the traffic congestion that occurs at the bridge approach. Proper traffic plan is important to improve the condition.

A common point of interest is the Mitford hospital just beside the river. The staff quarter of the hospital is at the opposite side. Every day people from staff quarter cross the river to join their working place, the hospital. Again there are some sick people who do not have the bodily condition to climb around 15 feet to reach the bridge. So, if any opportunity is created so that these people can easily access the bridge, their preference might be shifted towards using it.

We have to accept the fact that there will always be some people who will prefer boats. Keeping this in mind the river environment should be improved and the ghat conditions should be upgraded to promote the use of boats not only as transportation but also as recreational facilities. As safety measures, life jackets can be provided for emergency. Social awareness campaign can be arranged to promote the use of bridge to the boat travellers because it is always wise to think of the safety more than saving time.

## **VI. CONCLUSION**

The questionnaire survey was performed at the bank of the river Buriganga to fulfill certain objectives. It was found that huge number of people prefer boats as their travel modes even in extreme weather condition. Along with respondents' travel behavior, their origin and destination (O-D) were also recorded and an O-D diagram was drawn. And lastly some suggestions were made to ease the movement of people in the surrounding area.

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